Print This Page

Close This Window

Team Control Number

For office use only
T1 ________________
T2 ________________
T3 ________________
T4 ________________

# 41224

For office use only
F1 ________________
F2 ________________
F3 ________________
F4 ________________

Problem Chosen

**A**

## 2015 Mathematical Contest in Modeling (MCM) Summary Sheet

(Attach a copy of this page to your solution paper.)

Type a summary of your results on this page. Do not include the name of your school, advisor, or team members on this page.

text

# [TITLE]

## 1 Introduction

Academic success among undergraduate students at universities in the U.S. depends on several factors such as teacher capability, class size, and university funding. However, a well-funded institution is more advantaged in providing resources to its students than a university lacking adequate funds. Additional resources that are readily available to the student have been shown to increase student performance across the board.[**?**] The Goodgrant Foundation seeks to provide monetary grants to certain institutions with the goal to increase academic success among students at these universities.

The Goodgrant Foundation wants its dollars to be allocated in such a way that students benefits are maximized, but to do so in the same manner and focus of other large grant-awarding foundations would be redundant.

Thus,

## 2 Assumptions

These are some things we assumed in order to create our model!

## 3 Formal Prolegomena

First, some notational definitions. We have tabulated them below.

($\mathcal{U}$) The set of universities and colleges in question.

($\mathcal{D}$) The space of donations – this might have multiple dimensions over $\mathbb{R}$, depending on the specific categories of money we're interested in.

($\mathcal{T}$) The space of times for which we have data. We will also be interested in a "sliding window" of times trailing a given time; if $t \in \mathcal{T}$, we'll denote this window as $\mathcal{W}_n(t)$, where $n$ is the size of the window.

($\mathcal{V}$) The vector space of student metric variables $\{v_i\}$. Note that at this point, we have not yet committed ourselves to any such choice of variables, and so $\mathcal{V}$ includes also negative and neutral indicators of success.

($d\mathcal{V}$) The 1-form of

With this framework, we can now formulate the problem more precisely. To do any kind of induction at all, it is necessary to make some commonplace but sometimes very wrong independence assumptions (see Hume). Here's ours: we will assume that the effectiveness with which an institution can use money does not change over time[1]. We can now talk about the effect of donor money over time on the variables in $\mathcal{V}$ as a mapping

$$F : \mathcal{D} \times \mathcal{W}_n \to \mathcal{V} \tag{1}$$

that predicts the

# 4 Hello

Other things

[1] This is a reasonable assumption to make; while technically invalid, it seems very natural to judge an institution by its past performance – indeed, this is the best we can hope for from a dataset